

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
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PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)

Date of mailing
(day/month/year) 23. 8. 2005

Applicant's or agent's file reference
R724-PCT

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/JP2005/009008

International filing date (day/month/year)
11.05.2005

Priority date (day/month/year)
12.05.2004

International Patent Classification (IPC) or both national classification and IPC
Int.Cl.⁷ H01L21/205, C23C16/34

Applicant
SHOWA DENKO K.K.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Date of completion of this opinion 10.08.2005

Name and mailing address of the ISA/JP

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4R 8831

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/JP2005/009008

Box No. I Basis of the opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
☐ table(s) related to the sequence listing

b. format of material

- ☐ in written format
☐ in computer readable form

c. time of filing/furnishing

- ☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/JP2005/009008

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	6, 7, 11-12	YES
	Claims	1-5, 8-10, 13	NO
Inventive step (IS)	Claims	7	YES
	Claims	1-6, 8-13	NO
Industrial applicability (IA)	Claims	1-13	YES
	Claims		NO

2. Citations and explanations

Documents

D1:JP 2003-243302 A (SHOWA DENKO K.K.) 2003.08.29,
paragraph[0074]-[0076] & WO 2003/068699 A1
D2:JP 2004-096021 A (SHOWA DENKO K.K.) 2004.03.25,
paragraph[0068]-[0071] (Family: none)
D3:JP 2003-133649 A (SHARP CORPORATION) 2003.05.09, paragraph[0058]
& US 2005/042787 A1
D4:JP 2004-080047 A (TOYODA GOSEI CO. LTD.) 2004.03.11, paragraph[0019],
FIG1 (Family: none)
D5:JP 2002-057161 A (SONY CORPORARION) 2002.02.22, paragraph[0051]
& EP 1179859 A2

Claim 1-5

The subject matter of claim 1-5 does not meet the requirement of novelty. Claim 1-5 relate to a method for producing a p-type Group III nitride semiconductor. Such a method appears to be known from D1 (see paragraph [0074]-[0076]) or D2 (see paragraph [0068]-[0071]).

Claim 6

The subject matter of claim 6 does not appear to involve an inventive step in view of D1 and D3 cited in the ISR.

In the paragraph [0076] of D1 there is a description "After that, at the time of confirming that the temperature of the base becomes 300 degree C, supply of NH3 is stopped." So the technical feature of claim 6 is not disclosed in D1.

However, the technical feature of claim 6 is virtually suggested by D3, considering the description "At the time that the temperature of the base becomes 800 degree C, stop the supply of NH3." (see paragraph[0058])

Claim 7

None of the prior art documents cited in the ISR describes the technical feature of claim 7, and it is not obvious for the person skilled in the art to employ the technical feature.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: Box No. V

Claim 8

The subject matter of claim 8 does not meet the requirement of novelty. Claim 8 relates to a p-type Group III nitride semiconductor having a resistivity of 20-10,000 Ωcm . Such a semiconductor appears to be known from D4 (see paragraph[0019]).

Claim 9

The subject matter of claim 9 does not meet the requirement of novelty. Claim 9 relates to a Group III nitride semiconductor light emitting device composing at least a p-type layer, wherein the p-type layer is produced through a production method according to any one of claim 1 to 6. Such a light emitting device appears to be known from D1 (see fig1 and fig2) or D2 (see fig1 and fig2).

Claim 10

The subject matter of claim 10 does not meet the requirement of novelty. Claim 10 relates to a Group III nitride semiconductor light emitting device composing at least a p-type layer, wherein the p-type layer is produced through a production method according to claim 8. Such a light emitting device appears to be known from D4 (see fig1).

Claim 11

The subject matter of claim 11 does not appear to involve an inventive step in view of D1 and D5 cited in the ISR.

In the paragraph [0078] of D1 there is a description "forming p-type electrode bonding pad on the surface of Mg-doped GaN layer 14 by stacking Ti, Al, Au." So the technical feature of claim 11 is not disclosed in D1. However, the technical feature of claim 11 is virtually suggested by D5, considering the description "forming p-type electrode on the surface of p-type contact layer by evaporation of Pt layer and Au layer." (see paragraph[0051])

Claim 13

The subject matter of claim 13 does not meet the requirement of novelty. Claim 13 relates to a light emitting device according to any one of claim 9 to 11, which is of a face-up type. Such a light emitting device appears to be known from a description "a transparent p-type electrode 13 made of Au" (see the line 16, column 19 of D1) and a description "observes the light emission through the transparent p-type electrode 13" (see the line 31-32, column 19 of D1).

Claim 12

The subject matter of claim 11 does not appear to involve an inventive step in view of D1 cited in the ISR.

The technical feature of claim 12 is not disclosed in D1. However, a flip-chip type light emitting device is well known to the person skilled in the art as well as a face-up type light emitting device.